KAREZ RESEARCH IN THE TURPAN DEPRESSION

Measuring and inventorizing karez irrigation systems in order to gain more insights on their age and genesis.

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1. INTRODUCTION

Objectives
Gain more insights on the age and genesis of the karez by finding the oldest karez system in the region.

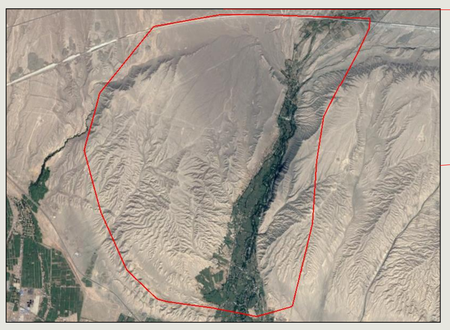
Method
Investigating, inventorizing, measuring and mapping of different individual karez wells. Extraction of the exact geometry using Pleiiades-1 satelite imagery (0,50 m resolution).

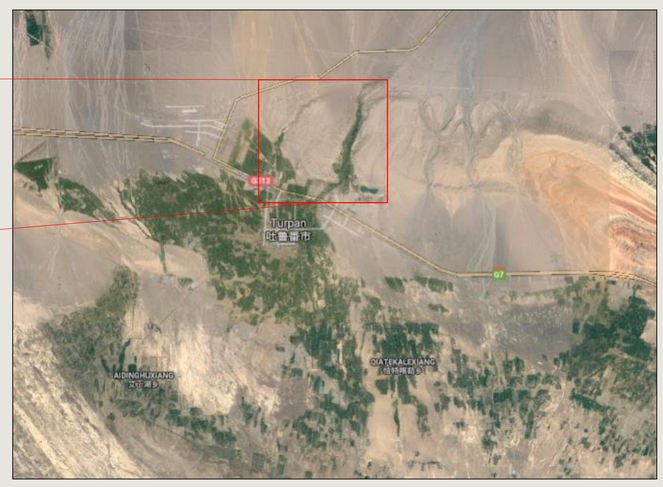
Application of the results
→ Composition of a database, containing each karez system in the region.
→ Gaining more insights the age and genesis of the karez

Workflow
1. Data acquisition: field work
2. Data processing: mapping and creating a database
3. Interpretation of the results

2. STUDY AREA

Area of interest of ± 30km²





Valley of the Grapes, 10 kilometres Northwest of Turpan

3 line-shaped karez systems, one in the North, one in the South and one central system.

3. DATA ACQUISITION: FIELD WORK

Measuring equipment
Tape measure (100 m) with a heavy object attached
Tape measure (50 m)

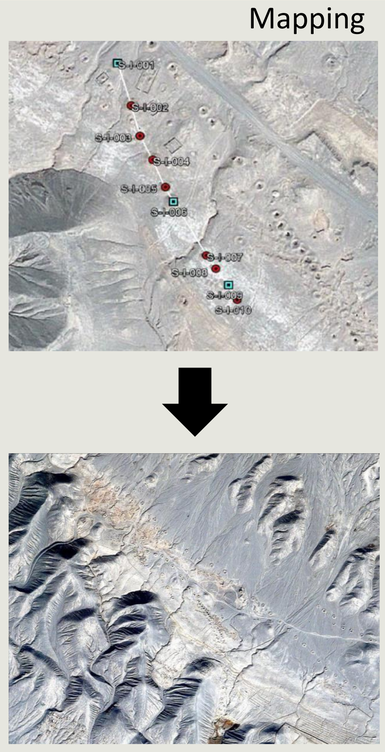
Mapping equipment
Tablet with Google Earth satellite images + location based services

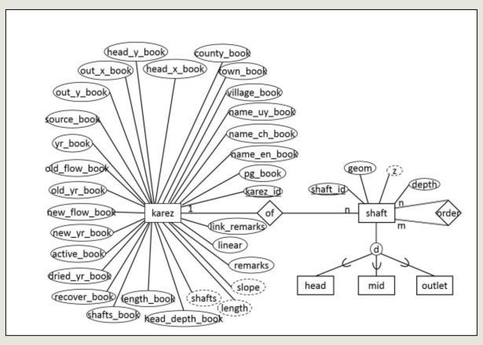
4. DATA PROCESSING: MAPPING & DATABASING

Inventorized parameters per individual well

Zone	Line	ID	Photo nr.	diam. NZ (cm)	diam. EW (cm)	h (cm)	active	Open	depth (cm)	wet	ϕ (°)	λ (°)	elev(m)	description
Z	D	000	3033	1030	1050	110	NA	O	1600	NO				
Z	D	010	3034	900	950	100	NA	O	680	NO				
Z	D	018	3035	1000	880	40	NA	O	290	NO				
Z	E	001	3036	830	850	41	NA	NO	0	NO				
Z	E	005	3037	510	490	70	NA	NO	400	NO				
Z	E	PIN4	3038	820	660	100	NA	NO	200	NO				
Z	D	023	3039	550	730	30	NA	NO	0	NO				
Z	D	019	3040	720	600	40	NA	O	240	NO				
Z	C	001	3041	1000	1000	90	A	HO	10000	Y				
Z	C	006	3042	1220	1240	110	A	HO	10000	Y				
Z	C	014	3043	1280	1350	110	A	HO	10000	Y				
Z	C	023	3044	1250	1350	80	A	HO		Y				
Z	C	032	3045	1330	1430	80	A	HO		Y				
Z	H	001	3046	710	600	70	NA	NO	0	NO				
Z	H	006	3047	1150	1250	80	NA	O	1250	NO				
Z	C	038	3048	1560	1330	120	A	HO	10000	Y				

Mapping





Database

Extraction of the precise geometry

5. RESULTS

Only one active line in the three examined systems
⟶ most systems are destroyed /ababonded / have disappeared
⟶ depth deeper than 100 metres

The irrigation of the Valley of the Grapes is provided by water pumps and not by the use of karez.

Relative chronology can be determined within lines of one system.

One line in the Southern system is in the surrounding of a brick building of Nestorian age. This same line is in the middle of a Chinese burial place.

Recent human impact (building of a High Speed Railway) destroyed a whole series of karez in the Northern system.

One karez line of the Northern system disappears into a gully of recent date.

6. CHALLENGES AND FUTURE RESEARCH

Data acquisition and processing
Difficulties in exact planimetric and altimetric localisation of the karez mounds.

Future research
Soil samples will be taken from both the active karez line and other lines (determined as ‘older’ by relative dating). Using an absolute dating, the oldest system in the region can be determined.

North of the Flaming Mountains, there’s a bigger area with more karez systems. Having obtained know-how on how to examine karez efficiently, this second complex can be the subject for a future research.

7. ACKNOWLEDGEMENTS

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